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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,858	02/08/2002	Chih-Hsien Nail Tang	MEGC120477	1410

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EXAMINER

SAGAR, KRIPA

ART UNIT PAPER NUMBER

1756

DATE MAILED: 11/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/071,858

Applicant(s)

TANG, CHIH-HSIEN NAIL

Examiner

Kripa Sagar

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) 21-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6, 9-12 and 14-20 is/are rejected.
- 7) ☒ Claim(s) 5, 7, 8 and 13 is/are objected to.
- 8) ☒ Claim(s) 1-41 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of the methods claims 1-20 in group I in Paper No. 7 is acknowledged. The traversal is on the ground(s) that the methods of group I and the computer readable media of group II are not related as a process of using a product. This is not found persuasive because, as stated in the restriction, the product as claimed can be used in a materially different process. The argument that the process as claimed can be practised only with the product is not germane. Further, as stated by Applicant, manual processes of proximity correction is available, although error prone and tedious. That the groups have widely divergent classifications further make the restrictions proper.

The requirement is still deemed proper and is therefore made FINAL.

Claims 1-20 are under consideration.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1,17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat. 6541165 to Pierrat in view of US Pat. 6586142 to Lin et al. .

The claims recite a method of correcting for optical proximity (OPC) in "predictable" layouts. The method identifies edges of the patterns and their proximity to

Art Unit: 1756

other structures by extending the edge normally and then classifying the edge. The “bridge” formed by the extension may be “far”, “medium” or “near”. Suitable corrections, based on proximity, include serifs and sub-resolution assist features (SRAFs), with phase assignments to avoid conflicts.

Pierrat teaches a method of forming SRAFs on phase shift masks (1;25-13-32). The method includes determining the spacing between adjacent features and assigning assist features at the edges. The assist features are assigned non-conflicting phases based on the design rule. (2;3-35).

Pierrat does not teach forming a bridge structure between features.

Lin teaches forming a bridges structure between features that connect assist features (fig.4,5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form bridge structures between features as taught by Lin in forming Pierrat’s SRAFs, because Lin teaches that the common bridge structure makes mask CDs (critical dimensions) less critical and easier to design (3;57-65).

4. Claims 1-4, 6,9-12,14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pat. 5585215 to Lee et al. in view of US Pat. 6197452 to Matumoto and further in view of US Pat. 6541165 to Pierrat.

The claims recite a method of optical proximity correction using the concept of bridge layer.

Lee teaches optical proximity correction using assist features such as serifs (fig.4) and SRAFs (Fig.5) added to regular polygonal arrays (“predictable layout”). The

Art Unit: 1756

corrections are based on the distances of the edges to the nearest neighbor (as shown in Fig.5). It teaches forming bridge structures between the rectangular features (fig.6-8) and placing assist features on the bridge layer. Lee's invention is for forming contact holes and storage nodes. Thus Lee teaches most of the elements of claims 1-4, 6, 11, 12, 14, 16, 17 and 19.

Lee does not teach: a plurality of assist features proximal to an edge (cl.9), assigning phases to the features (cl.1, 10, 17), staggered features (cl.15), square SRAFs (cl.18, 20).

Matumoto teaches placing multiple assist features at the edge of a pattern (Fig.2) wherein the patterns have different periodicities (staggering). The assist features are square-shaped. It does not teach forming the square by a particular method (cl.20); however the ultimate shape may be arrived at by any method to effectively function as a non-printing feature. Conflicting and overlapping features are adjusted (fig.7, 8)

Matumoto does not teach phase assignment techniques.

Pierrat teaches forming SRAFs with main patterns on phase shift masks. It teaches methods of assigning phases to SRAFs without conflict (Fig.12, 13, 18).

It may be noted that all three references solve the problem of OPC, as does the instant invention. One of ordinary skill in the art at the time of the invention would have been motivated to combine the teachings of Matumoto and Pierrat in forming the assist features taught by Lee because Matumoto teaches that it facilitates the layout of the main pattern with less critical dimensions (3; 46-50) and Pierrat teaches that the method

Art Unit: 1756

of phase assignment renders layout of complex patterns easy (4;43-48) and is amenable to automation (8;63-9;5).

Allowable Subject Matter

5. Claims 5,7,8,13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 5, recites the steps of forming a bridge. Lee teaches forming a bridge between main patterns and placing assist features on the bridge layer. It does not teach joining assist features or resizing them.

Claims 7,8,13 recite the steps of generating the bridge layer. This is not taught by the references cited.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Pat. 6534224 to Lukanc teaches methods of assigning phases to *overlapping* features with regular shapes (Fig.12). Its application to assist features would not be obvious.

US Pat, 5537648 to Liebmann et al. teaches extending the edge of a feature to a neighboring feature to determine distances and to assign non-conflicting phases. It does not teach assist features and the extension of the method to OPC would not be obvious.

Art Unit: 1756

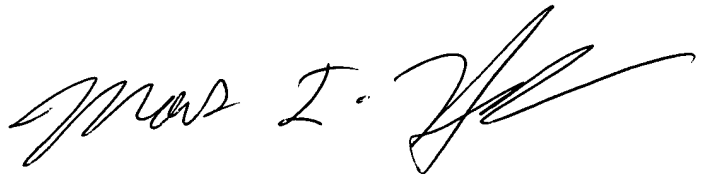
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kripa Sagar whose telephone number is 703-605-4427.

The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on 703-308-2464. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

MH/ks

A handwritten signature in black ink, appearing to read "Mark F. Huff", with a stylized flourish at the end.

**MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700**